Civil SSDA Report – Stormwater Management

Mosman High School Upgrade – 745 Military Rd, Mosman NSW 2088

Prepared for Multiplex Australasia / 16 February 2021

201635

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1.0 Introduction

Taylor Thomson Whitting Pty. Ltd. (TTW) has been engaged by Multiplex to prepare an updated Stormwater Management Report in accordance with the requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development (SSD – 10465) for a proposed upgrade to Mosman High School located at 745 Military Road, Mosman NSW 2088.

ACOR Consultants has previously completed a Stormwater Assessment for the proposed upgrade (Refer to Mosman High School Upgrade, Phase 2 Concept Design Report – Civil Services, ACOR, 2020). However, the proposed upgrade layout and details has since been changed.

1.1 Site

The site is located at 745 Military Road, Mosman NSW 2088 (Lot 1 DP1268793) and is within Mosman Municipal Council (LGA). The site is bordered by Military Road to the east, Gladstone Avenue to the west, Belmont Road to the north and Avenue Road to the south. The site locality is shown in Figure 1.

The area of the site is 14488 m^2 based on survey data provided by LTS Lockley (Shown in Attachment B) and generally grades from southeast to northwest (3% average), with highest level of 79.20 mAHD at south eastern boundary falling to 74.30 mAHD at north western boundary.

Figure 1: Site Locality Plan (Six Map)

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The site falls within Infrastructure (SP2) land use based on Mosman Local Environmental Plan (LEP, 2012) and is currently used as educational facility. The site in existing conditions incorporates multiple buildings, sport fields, an open carpark and several other paved areas. The site incorporates two pedestrian entry egresses via Military Road and Belmont Road and two access driveways via Gladstone Avenue.

1.2 Scope and Objectives

The objective of this report is to addresses the flooding requirements of the SEARs (key issues 16 & 17) as follows:

Key issue 16 (Drainage):

- Detail measures to minimise operational water quality impacts on surface waters and groundwater.
- Stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties.

Key issue 17 (Flooding):

- Identify flood risk on-site (detailing the most recent flood studies for the project area) and consideration of any relevant provisions of the NSW Floodplain Development Manual (DIPNR, 2005), including the potential effects of climate change, sea level rise and an increase in rainfall intensity. If there is a material flood risk, include design solutions for mitigation.

In view of above, the scope of this report would be as followings:

- Identify stormwater design criteria as well as the relevant Council controls for the site stormwater quality and quantity management.
- Prepare the concept stormwater drainage system design (minor and major) for the proposed upgrade and in accordance with Council requirements.
- Prepare a Water Sensitive Urban Design (WSUD) for the proposed upgrade and in accordance with Council requirements.
- Provide an overview of the site flood affection.
- Prepare a Soil Erosion and Sediment Control Plan.

This report must be read in conjunction with the following documentation:

- Architectural plans prepared by Woods Bagot.
- Landscape Architectural concept plans prepared by Black Beetle.
- Site topographic survey prepared by LTS Lockley.

1.3 Reference Documents

The stormwater system has been designed to comply with the following standards and local authority requirements:

- Bureau of Meteorology IFD data – sourced from http://www.bom.gov.au
- Australian Rainfall and Runoff (2019) – with AR&R (2016) rainfall datasets sourced from BoM

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- Mosman Open Space & Infrastructure DCP (2012) – amended August 2020
- Mosman Council's Policy for Stormwater Management in Mosman (2007)
- Relevant Design Guidelines from NSW Department of Education's EFSG (DG95 Stormwater & DG96 Civil Works)

2.0 Proposed Upgrade

Based on architectural plans prepared by Woods Bagot (January 2021), the proposed upgrade consists of following works:

- Demolition of Building B, Building C, and part of Building E.
- Removal of existing trees.
- Construction of a new part 3/ part 4 storey school building (Building G) plus rooftop fencing on the corner of Military Road and Belmont Road.
- Landscaping works.
- Reinstatement of staff car parking.

3.0 Flood Conditions

There is no available Council adopted flood study relative to the site. Therefore, Mosman Council Stormwater System Maps (Attachment A) was used for this assessment. The site is located at upstream of Mosman Bay East catchment with Military Road being the upstream catchment boundary. Overland flows on Military Road bypass the site and flow downstream through Avenue Road and Belmont Road. Onsite overland flows mainly discharge onto Gladstone Avenue. Gladstone Avenue also drains through Avenue Road and Belmont Road.

Based on the foregoing, it is reasonable to assume that upstream overland flows are effectively contained within the surrounding roads during major events and therefore, the site is not flood affected.

4.0 Stormwater Quantity

4.1 Existing Conditions

The site survey provided by LTS Lockey as well as Mosman Council Stormwater System Map (Attachment A) were used to assess the site drainage mechanism in existing conditions.

The site in existing conditions breaks down into two main catchments based on the existing topography and local flow regime as shown in Figure 2. Stormwaters within the site northern catchment discharge to Belmont Road whilst the southern catchment drains to Avenue Road.

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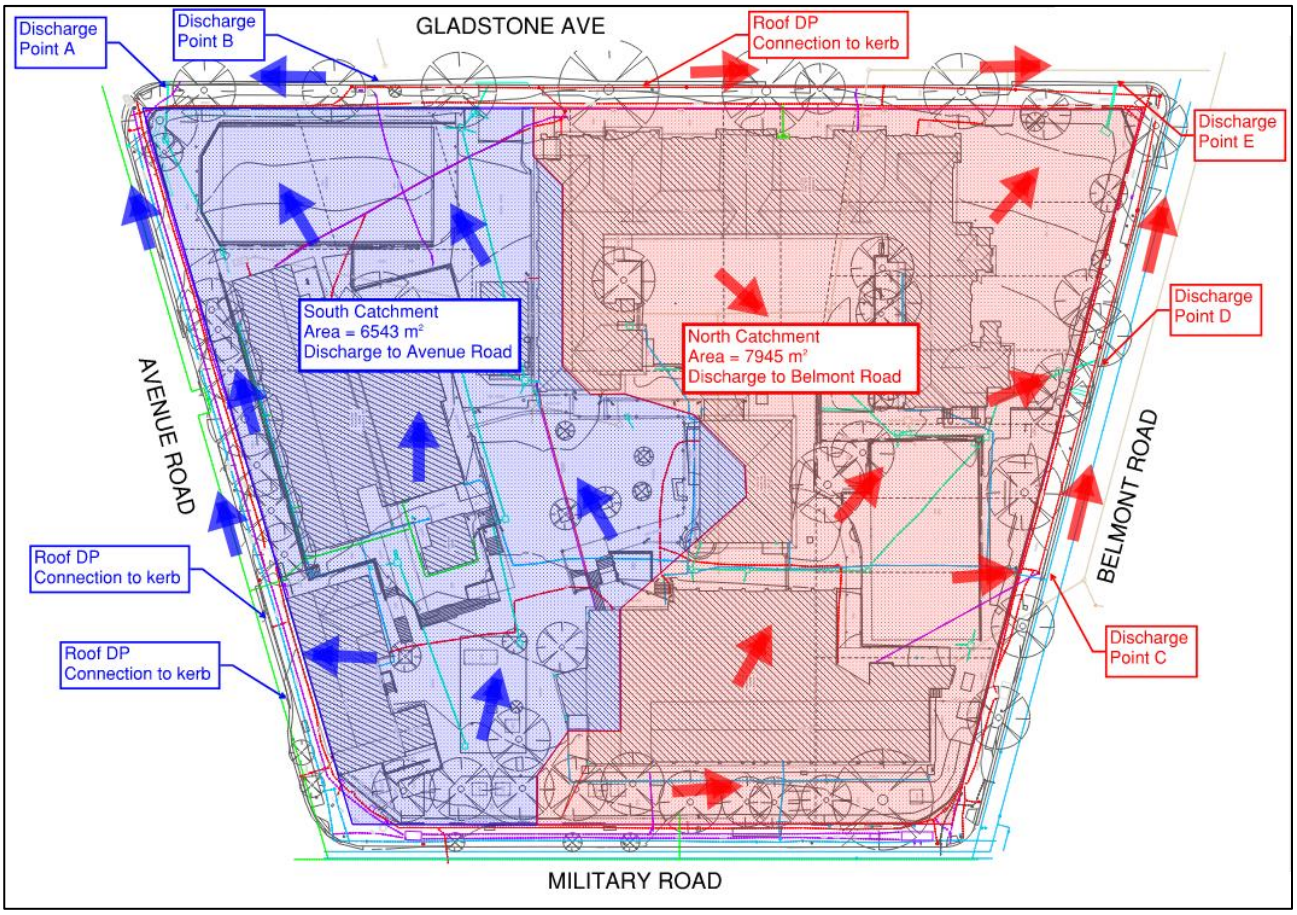

Figure 2: Site main catchments and overall site stormwater flow regime in existing conditions

The site sub-catchment boundaries in existing conditions were delineated using available survey data and based on the site existing discharge points as shown in Figure 3.

In order to estimate the stormwater peak discharge flow rates from the site, Mosman Council recommends the design criteria as outlined in Section 1.3 of Policy for Stormwater Management in Mosman (2007) to be followed.

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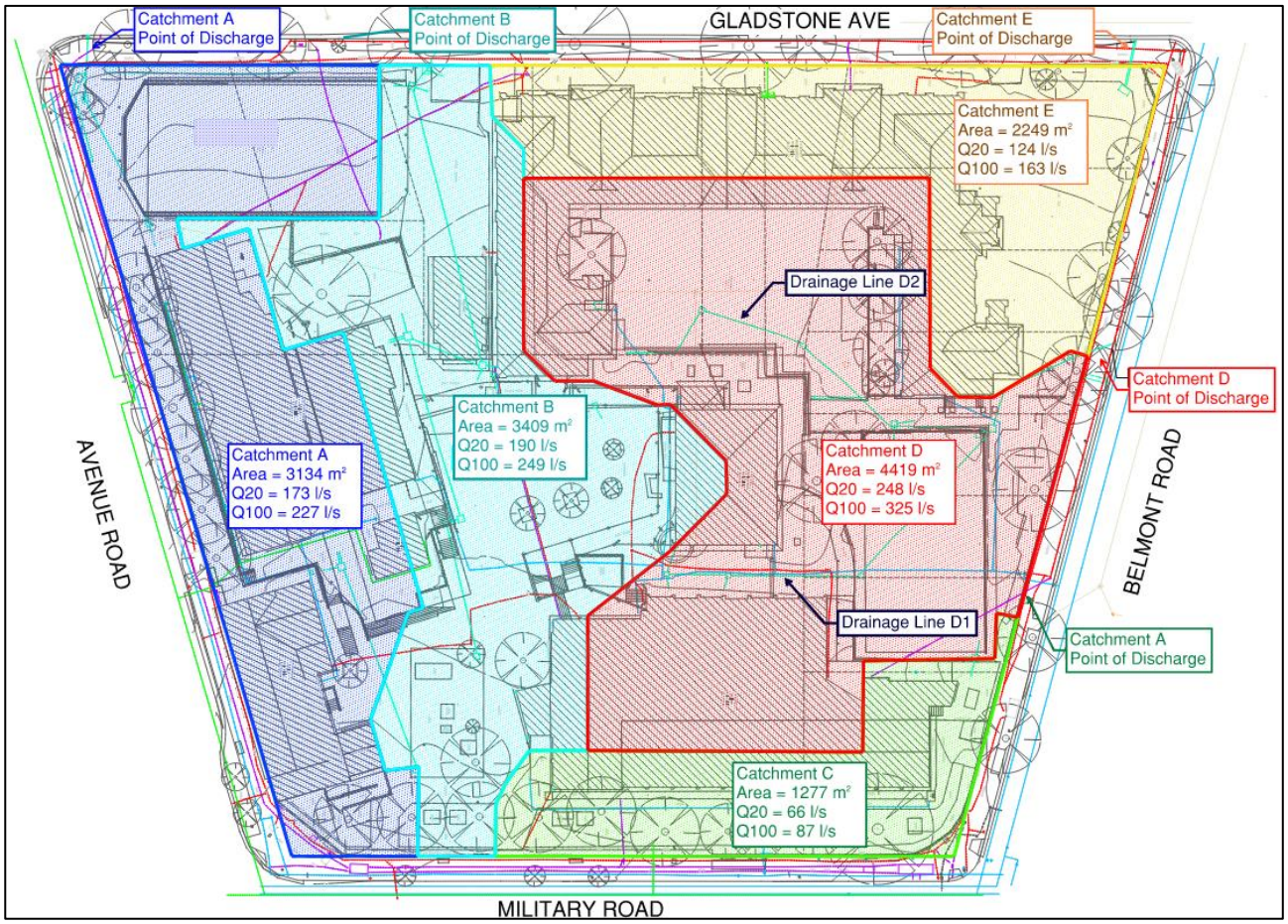

Figure 3: Site sub-catchment plan in existing conditions

AR&R (2016) design rainfall intensities for 5 minutes time of concentration were also obtained from BOM website. Table 1 compares the rainfall design intensities for the 5 minutes duration minor and major storms extracted from AR&R 2016 with design rainfall intensities recommended by Council.

Table 1: Design rainfall depths for the 5 minutes duration minor and major storms - AR&R 2016 vs Council's

	Design Rainfall intensity (mm/hr)	
Storm Event (ARI)	Recommended by Council	AR&R (2016)
1 in 20 Year	206	207
1 in 100 Year	267	272

We note that the AR&R (2016) design rainfall intensity for minor and major events are somewhat similar to those of Council's recommended.

The site catchment parameters and peak discharge flow rates for minor (1 in 20 Year ARI) and major (1 in 100 Year ARI) storm events in existing conditions are summarised in Table 2.

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Table 2: Catchment Parameters and Peak Discharge Flow Rates - Existing Conditions

					Peak Flow Rate (l/s)	
Sub-Catchments	Area (m^2)	Pervious Area (m^2)	Impervious Area (m^2)	Fraction Impervious	1 in 20 Year ARI	1 in 100 Year ARI
A	3134	498	2636	0.84	167	173
B	3409	442	2967	0.87	188	190
C	1277	504	773	0.61	123	066
D	4419	446	3973	0.90	203	248
E	2249	376	1873	0.83	0.116	124
Total	14488	2201	12287	0.85	798	800

Notes:
1) *Time of concentration for previous and impervious areas assumed 5 minutes.*
2) *1 in 20 Year ARI Rainfall intensity = 207 mm/hr.*
3) *1 in 100 Year ARI Rainfall intensity = 272 mm/hr.*

4.1.1 Site Drainage System in Existing Conditions

The site drainage mechanism in existing conditions consists of four main discharge points (as shown on Figure 2) and associated inground pipe network as outlined in the followings:

Sub-catchment A:

The existing inground drainage system associated with catchment A drains to an existing kerb inlet pit at Gladstone Avenue (discharge point A).

In addition, two existing pipe connections to Avenue Road kerb and gutter were detected at south eastern boundary during the site visit. These two drainage outlets most likely are connected to the existing downpipes from Block A.

Major stormwater flows greater than the 1 in 20 Year ARI storm event will be conveyed through overland flows towards discharge point A where, overtop the existing retaining wall at south-western boundary and flow onto Gladstone Avenue.

Sub-catchment B:

The existing inground drainage system associated with catchment B drains to Gladstone Road via an existing kerb connection approximately 40 metres away from the intersection of Gladstone Road and Avenue Road (discharge point B).

Major stormwater flows greater than the 1 in 20 Year ARI storm event will flow through the existing access driveway and discharge to Gladstone Avenue.

Sub-catchment C:

Stormwaters from catchment C discharge out to Belmonte Road via an existing kerb and gutter connection approximately 20 metres away from the intersection of Belmonte Road and Military Road (discharge point C).

Stormwater flows greater than the 1 in 20 Year ARI storm event flow onto Gladstone Avenue through sheet flow as well as run onto the catchment D.

Sub-catchment D:

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Inground drainage line D1 starts from a point near the western entrance of Block B and runs northward to the tennis court. Then passes underneath of the tennis court and connects to an existing pit northwest of the court.

Inground drainage line D2 starts from a point near the Block D access ramp running towards north and eventually joins the drainage line D1 at the existing pit northwest of the tennis court.

Drainage lines D1 & D2 connect to an existing pit at northwest of the tennis court and subsequently discharge to Belmont Road via a triple RHS kerb connection and a single kerb connection (discharge point D).

Major stormwater flows greater than the 1 in 20 Year ARI storm event bypass the discharge point D and flow west onto catchment E.

Sub-catchment E:

Stormwaters from catchment E discharge out to Gladstone Avenue via an existing kerb and gutter connection (discharge point E). Stormwater flows greater than the 1 in 20 Year ARI storm event will flow through the existing driveway onto Gladstone Avenue.

In addition, two pipe connections to Gladstone Avenue kerb and gutter were detected along the site western boundary during the site visit. These two drainage outlets most likely are connected to the existing downpipes from Block D.

Major stormwater flows greater than the 1 in 20 Year ARI storm event will overflow through the existing access driveway and discharge to Gladstone Avenue.

Internal inground stormwater drainage system is apparently suffering from multiple blockages, largely due to sedimentation and tree root intrusions which result in poor drainage performance during storm events. In addition, there are multiple instances of water ponding and pavement deterioration observed across the site. The continual nuisance flooding at the car park area as well as the basketball court next to building block D to point out a few (refer Figure 5, and Figure 6).

Figure 5: Pipe connection to Gladstone Road kerb and gutter in existing conditions

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Figure 6: Stormwater ponding marks at existing basketball court next to building block D due to inefficient site drainage in existing conditions

The existing connection to kerb & gutter at Belmont Road (discharge point D) is ostensibly disrupted (See Figure 7).

Existing pipe network upstream of the discharge point D seems to also suffer major blockages which certainly impacts the pipe discharge capacity at point D. Intense sedimentation and water ponding marks over an area around the existing pit immediately upstream of the discharge point D (as shown in Figure 7) is another clear evidence that stormwaters back up onto the site during storm events.

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Figure 6: Stormwater connection to kerb and gutter at Belmont Road

Figure 7: Sedimentation and stormwater ponding marks at the car park area upstream of discharge point D

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4.2 Proposed Conditions

The proposed upgrade consists of demolition of Building B, Building C, and part of Building E and construction of a new building on the corner of Military Road and Belmont Road.

The proposed upgrade falls primarily within sub-catchment B and sub-catchment D. Hence, the stormwater from the proposed building is more desirable to be proportioned between point B & point C, so that to maintain the site discharge flow regime as close to the existing conditions as possible and prevent changes to downstream flow regime.

In view of the above, the existing site sub-catchments will alter to what is shown in Figure 8. The site catchment parameters and peak discharge flow rates in proposed conditions are also summarised in Table 3.

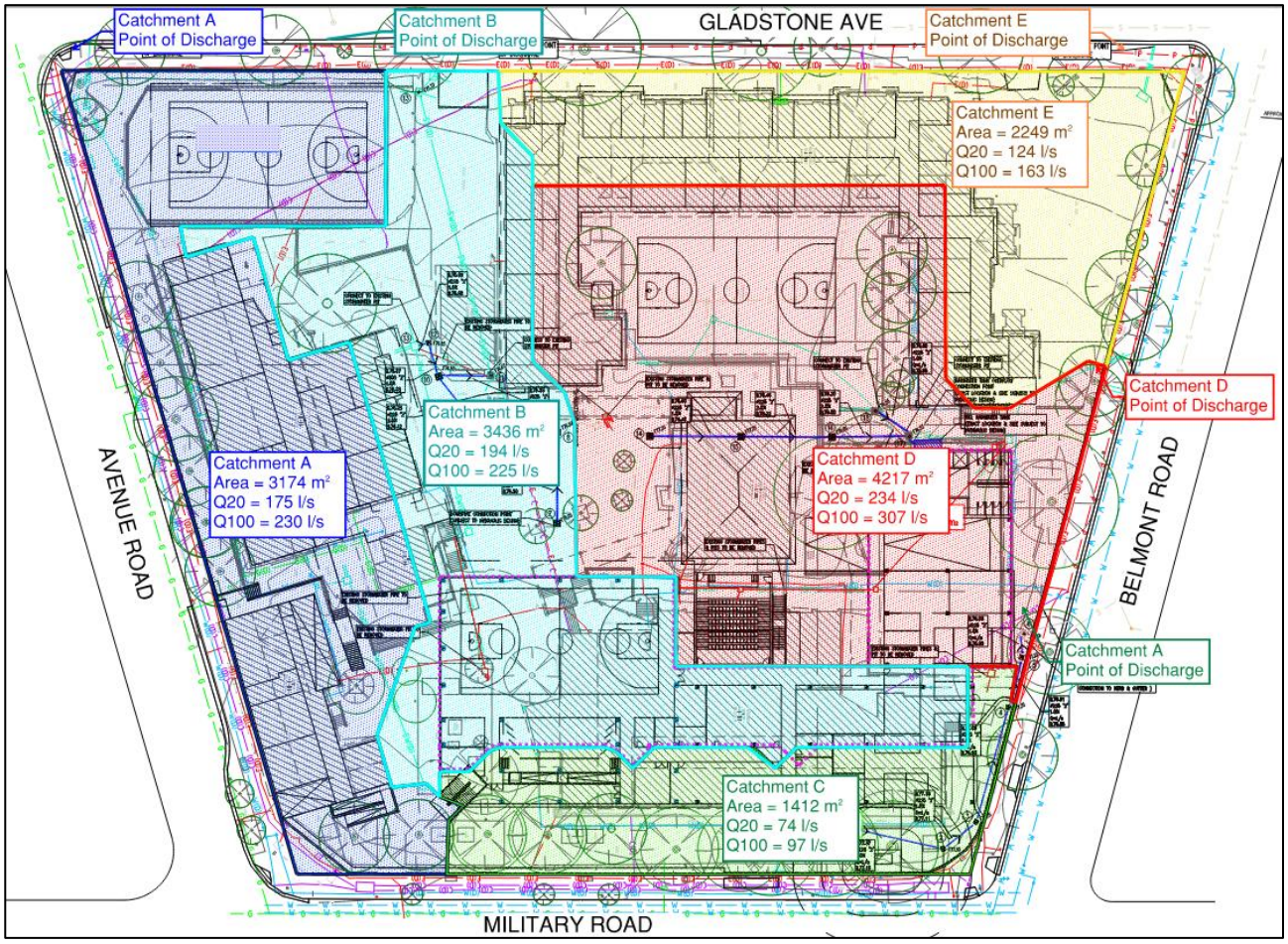

Figure 8: Site sub-catchment plan in proposed conditions

The site total stormwater discharge peak flow rates to existing discharge points in Avenue Road and Belmont Road in both existing and proposed conditions are summarised in Table 4. The site discharge peak flow rates to Avenue Road and Belmont Road would have minimal changes (less than 2%) as a result of the proposed upgrade and therefore, changes to downstream flow conditions would be negligible.

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Table 3: catchment parameters and peak discharge flow rates - proposed conditions (AR&R 2016)

					Q (m3/s)	
Sub- catchments	Area (m^2)	Pervious Area (m^2)	Impervious Area (m^2)	Fraction Impervious	1 in 20 Year ARI	1 in 100 Year ARI
A	3174	498	2675	0.84	0.175	0.230
B	3436	248	3188	0.93	0.194	0.255
C	1412	504	909	0.64	0.074	0.097
D	4217	600	3617	0.86	0.234	0.307
E	2249	376	1873	0.83	0.124	0.163
Total	14488	2226	12262	0.85	0.801	1.053

Notes:
1) *Time of concentration for previous and impervious areas assumed 5 minutes.*
2) *1 in 20 Year ARI Rainfall intensity = 207 mm/hr.*
3) *1 in 100 Year ARI Rainfall intensity = 272 mm/hr.*

Table 4: Site stormwater discharge to Avenue Road and Belmond Road in existing and proposed conditions

	Existing Conditions			Proposed Conditions			Difference in Peak Flow Rates	
		Peak Flow Rate (l/s)			Peak Flow Rate (l/s)			
Site Catchments	Area (m^2)	1 in 20 Year ARI	1 in 100 Year ARI	Area (m^2)	1 in 20 Year ARI	1 in 100 Year ARI	1 in 20 Year ARI	1 in 100 Year ARI
South (Discharge to Avenue Road)	6543	363	477	6610	369	485	1.7%	1.7%
North (Discharge to Belmond Road)	7945	438	575	7878	432	567	-1.4%	-1.4%

TTW understand that the closest point of discharge to Council's network is an existing kerb inlet pit at intersection of Avenue Road and Gladstone Avenue (discharge point A, see section 4.1.1 for details). This piped network discharges piped flows back to the kerb / road downstream from the site.

We also note that redirecting more stormwater flows from the proposed upgrade to discharge point A would result in changes to the existing flow regime and likely impact the downstream properties.

4.2.1 Site Drainage System in Proposed Conditions

TTW propose the following changes to the existing drainage system. Refer to TTW's Drawing 201635 - C04/P01 (not attached to this report) for details.

Discharge Point A:

Existing pipeline A as well as the connection to discharge point A will be retained. The two existing downpipe connections to Avenue Road kerb and gutter at south eastern boundary (from building block A) will also be retained.

Discharge Point B:

A portion of the proposed upgrade will drain through discharge point B. in addition to existing network, a new 225mm pipeline and a 300mm pipeline are also proposed to convey the stormwaters of minor events to discharge point B.

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Discharge Point C:

Discharge point C is comprised of triple 100mm pipe connection to Belmont Road kerb and gutter in existing conditions. The existing kerb connection at discharge point C will be retained. A new 225mm pipeline is proposed to drain the stormwaters from sub-catchment C to discharge point C.

Discharge Point D:

The existing pipeline D1 is to be removed due to interception with proposed works. A proposed pit and pipe network will redirect stormwaters from proposed upgrade and discharge to Belmond Road through the existing connection to kerb and gutter.

Drainage line D2 appears to be undersized in existing conditions which may result in water ponding over the existing basketball court adjacent to building block D. The existing basketball court appears to act as a detention basin and compensates for the limited discharge capacity at discharge point D in existing conditions.

the existing pipeline D2 and connection to kerb and gutter at Belmont Road will be retained. A new 225mm pipeline is proposed to drain the stormwaters from northern part of sub-catchment D to discharge point D through the existing kerb and gutter connection to Belmont Road.

We recommend that the existing stormwater network upstream of discharge point D to be reconditioned and reinstated in order to recover the design drainage capacity and ensure adequate performance during storm events.

Discharge Point E:

Based on site visits the existing connection to kerb and gutter at north western boundary is almost blocked. We recommend the drainage line B to be investigated, cleared and repaired to alleviate stormwater nuisance and water ponding at the car park area during storm events.

The two existing downpipe connections to Gladstone Avenue kerb and gutter at western boundary (from building block D) will also be retained.

4.3 OSD Requirement Assessment

The site surface is primarily impervious in existing conditions. The proposed upgrade is located predominantly within the previously impervious surfaces which were approved as part of the previous Mosman High School development. Hence, increase in impervious area due to the proposed upgrade is less than 5% (refer to Table 2 & Table 3). Therefore, based on Clause (i) Section 2.3 of Mosman Council Policy for Stormwater Management in Mosman (2017) the proposed upgrade is subject to exemption for OSD.

5.0 Stormwater Quality

Mosman Council requires stormwater generated from parking facilities to be treated for contaminants prior to discharge into Council's stormwater drainage system (Open Space & Infrastructure DCP, 2012, Section 4.13 Objective 3).

Based on the architectural plans, the existing staff carpark area and associated vehicular access at northwest corner will be retained and the proposed upgrade will not increase the existing parking area. In addition, the proposed upgrade will result in alteration of largely paved areas to roof areas. Hence, stormwater pollutions are not expected to increase in proposed conditions and therefore, no stormwater quality treatment is deemed required.

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Appendix A

Mosman Council Stormwater System Maps

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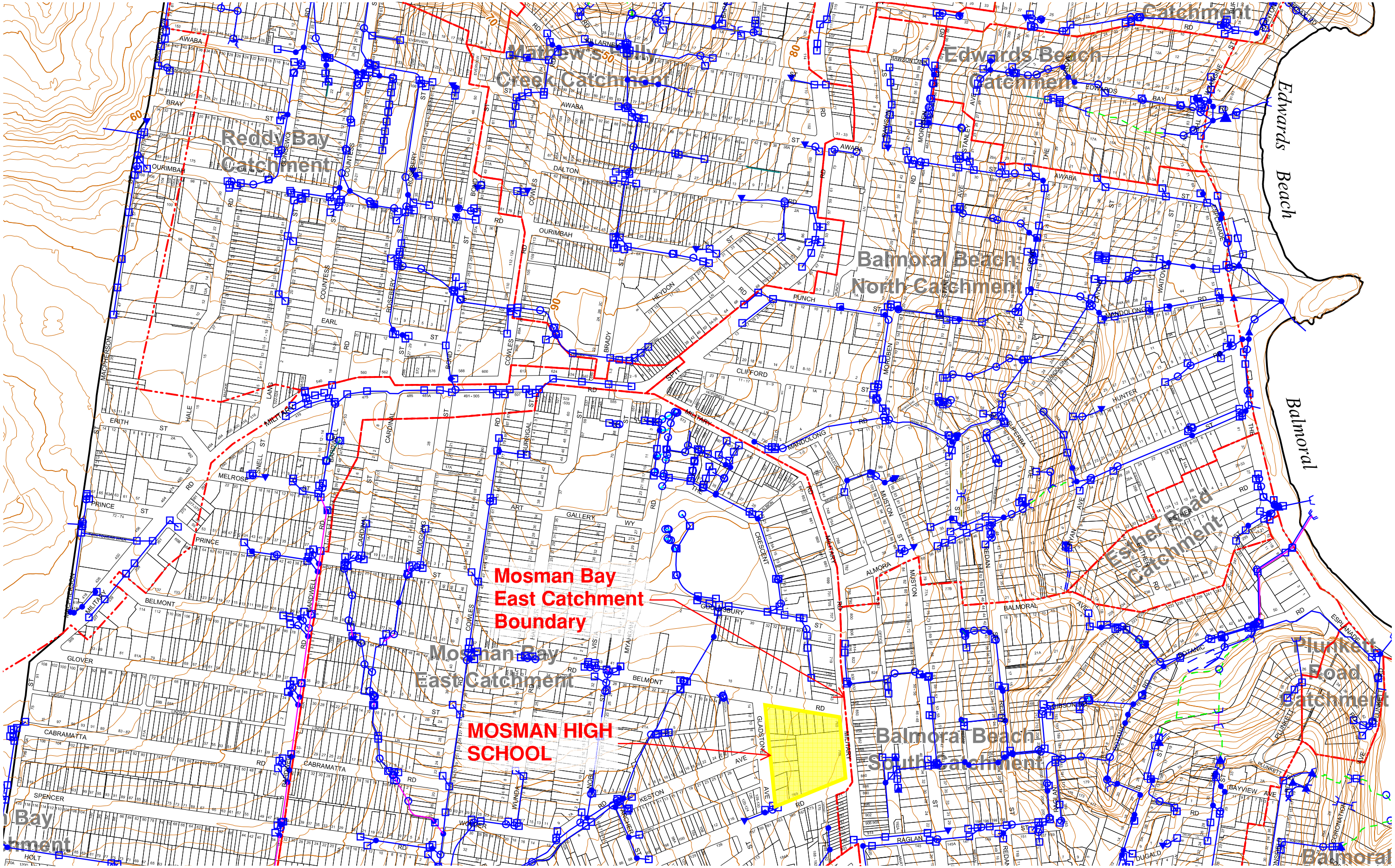

Mosman Municipal Council

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SCALE

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Meters

LEGEND

REFER PAGE 7

STORMWATER SYSTEM MAP 2

LEGEND

- Pit
- Drop Pit
- Manhole
- Junction
- CDS Unit
- Sand Filter
- Pressure Relief Unit
- Headwall
- Converter
- Capped End
- Stormwater Pipe
- Culvert
- Private Drainage System
- Natural Watercourse
- Open Drain
- Open Earth Drain
- Grate Over Drain
- Open Half Round Pipe
- Catchment Boundary

SOME PIPE SIZES ARE SHOWN ON THE MOSMAN DRAINAGE AND CATCHMENT MAP

Mosman Municipal Council

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STORMWATER

LEGEND

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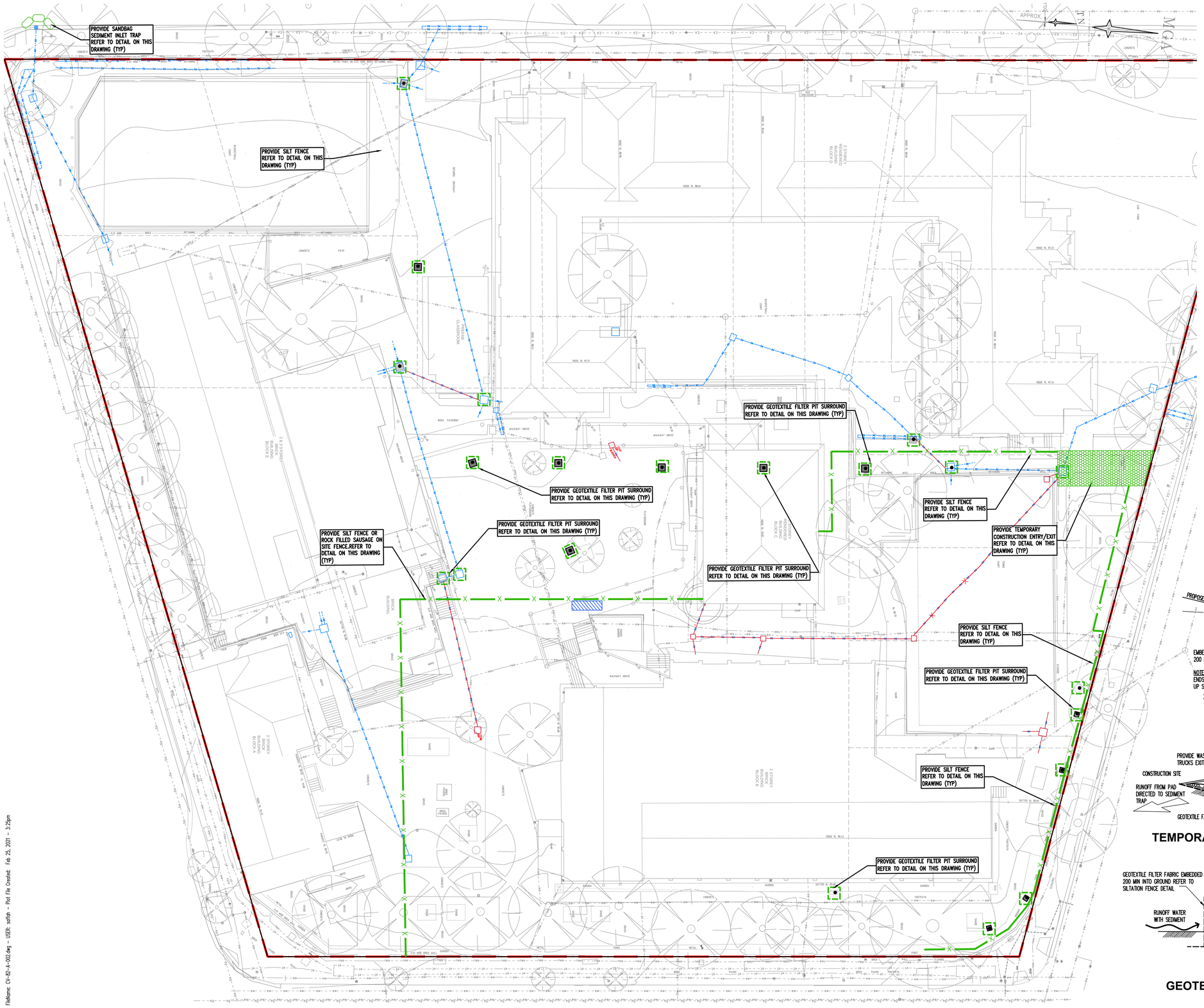
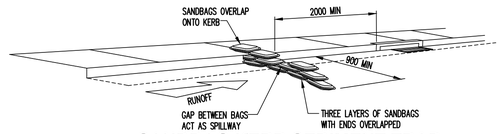




SANDBAG KERB SEDIMENT TRAP

NTS

EROSION AND SEDIMENT CONTROL LEGEND

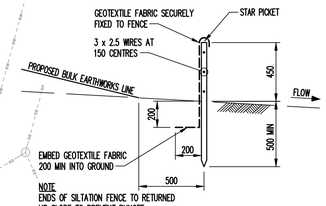
- Batter
- Siltation fence
- Stormwater pit with Geotextile filter surround
- Hay bale barriers
- Sandbag sediment trap
- Catch drain
- Overland flow path

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
   (A) Local authority requirements,
   (B) EPA – Pollution control manual for urban stormwater,
   (C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control **drawings and notes are** provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
   The erosion and sediment control **plan** shall be implemented and adapted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.



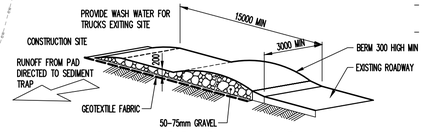
SILTATION FENCE DETAIL

SCALE 1: 20

WATER QUALITY TESTING REQUIREMENTS

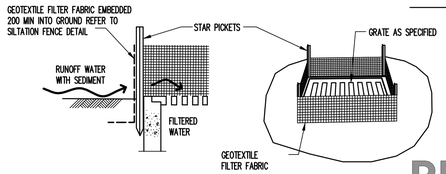
Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:

- Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
- If required subject to the environmental consultants advice, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system.This should include comments from a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site into Councils storm water drainage system. Outlining the proposed, ongoing monitoring, contingency plans and validation program that will be in place to continually monitor the quality of water discharged from this site. This should outline the frequency of water quality testing that will be undertaken by a suitably qualified environmental consultant.



TEMPORARY CONSTRUCTION EXIT

NTS



GEOTEXTILE FILTER PIT SURROUND

NTS

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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Rev	Description	Eng	Draft	Date
P3	ISSUE FOR APPROVAL	AH	SH	25.02.21
P2	ISSUE FOR APPROVAL	AH	JW	16.02.21
P1	PRELIMINARY	AA	JW	09.02.21

Rev Description Eng Draft Date | Rev Description Eng Draft Date

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Project
MOSMAN HIGH SCHOOL UPGRADE
745 MILITARY ROAD, MOSMAN , NSW 2088

Sheet Subject
EROSION & SEDIMENT CONTROL PLAN

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250	JW	SB

Job No	Drawing No	Revision
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MOSMAN HIGH SCHOOL
CIVIL WORKS

GENERAL NOTES

1. Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer
2. Strip all topsoil from the construction area. Topsoil should be reused where identified suitably ameliorated or disposed off site.
3. Make smooth connection with all existing works.
4. Compact subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint TBC with project arborist and structural engineer.
5. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority, the Contractor is to ensure that the drawings used for construction have been approved by all relevant authorities prior to commencement site.
6. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority is to be carried out in accordance with the requirements of the relevant Authority. The Contractor shall obtain these requirements from the Authority. Where the requirements of the Authority are different to the drawings and specifications, the requirements of the Authority shall be applicable.
7. For all temporary batters refer to geotechnical recommendations.

REFERENCE DRAWINGS

1. These drawings have been based from, and to be read in conjunction with the following Consultants drawings. Any conflict to the drawings must be notified immediately to the Engineer.

Consultant	Dwg Title	Dwg No	Rev	Date
LTS	SURVEY	X-SURVEY	1	30.01.20
WOODS BAGOT	GROUND FLOOR PLAN	AR-02-LO-001	1	18.02.21

PIT SCHEDULE

Note: Grate size does not necessarily reflect pit size, refer pit type details, shown on detail sheets – **CV-82-A-006**
Final internal pit dimensions are to comply with AS3500

Type	Description	Cover (Clear Opening)	Number
A	Surface inlet pit	600 x 600 Class C galvanised mild steel grate hinged to frame	2,3,4
		900 x 900 Class C galvanised mild steel grate hinged to frame	7,8,9,11,13, 14,15
		1200 x 900 Class C galvanised mild steel grate hinged to frame	19
	Junction pit	600x600 class C cast iron cover with concrete infill	5
B	Existing pit	Existing pits to remain	1,6,10,12, 16,17
C	Existing pit	Existing pits to be removed	18,19,20,21

STORMWATER DRAINAGE NOTES

1 Stormwater Design Criteria :
(A) Average recurrence interval –
1:100 years for roof drainage to first external pit
1:20 years for paved and landscaped areas
(B) Rainfall intensities –
Time of concentration: 5 minutes
1:100 years = 272 mm/hr
1:20 years = 207 mm/hr
(C) Runoff coefficients –
Roof areas: C_{100} = 1.00
Roads and paved areas: C_{20} = 1.00
Landscaped areas: C_{20} = 0.75

2. Pipes 300 dia and larger to be reinforced concrete Class "2" approved spigot and socket with rubber ring joints U.N.O.
3. Pipes up to 300 dia may be sewer grade uPVC with solvent welded joints, subject to approval by the engineer.
4. Equivalent strength VCP or FRP pipes may be used subject to approval.
5. Precast pits may be used external to the building subject to approval by Mosman council.
6. Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
7. Where subsoil drains pass under floor slabs and vehicular pavements, unslotted uPVC sewer grade pipe is to be used.
8. Grates and covers shall conform with AS 3996–2006, and AS 1428.1 for access requirements.
9. Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
10. Care is to be taken with invert levels of stormwater lines. Grades shown are not to be reduced without approval.
11. All stormwater pipes to be 100 dia at 1.0% min fall U.N.O.
12. Subsoil drains to be slotted flexible uPVC U.N.O.
13. Adopt invert levels for pipe installation (grades shown are only nominal).

SURVEY AND SERVICES INFORMATION

SURVEY

Origin of levels : SSM21004 RL71.886
Datum of levels : A.H.D. AUSTRALIAN HEIGHT DATUM
Coordinate system : MGA
Survey prepared by : LTS
Setout Points : CONTACT THE SURVEYOR

Taylor Thomson Whitting does not guarantee that the survey information shown on these drawings is accurate and will accept no liability for any inaccuracies in the survey information provided to us from any cause whatsoever.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on Taylor Thomson Whittings drawings have been plotted from diagrams provided by service authorities. This information has been prepared solely for the authorities own use and may not necessarily be updated or accurate.

The position of services as recorded by the authority at the time of installation may not reflect changes in the physical environment subsequent to installation.

Taylor Thomson Whitting does not guarantee that the services information shown on these drawings shows more than the presence or absence of services, and will accept no liability for inaccuracies in the services information shown from any cause whatsoever.

The Contractor must confirm the exact location and extent of services prior to construction and notify any conflict with the drawings immediately to the Engineer/Superintendent.

The contractor is to get approval from the relevant state survey department, to remove/adjust any survey mark. This includes but is not limited to; State Survey Marks (SSM), Permanent Marks (PM), cadastral reference marks or any other survey mark which is to be removed or adjusted in any way.
Taylor Thomson Whitting plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.

SITEWORKS NOTES

1. All basecourse material to comply with RMS specification No 3051 and compacted to minimum 98% modified standard dry density in accordance with AS 1289 5.2.1.
2. All trench backfill material shall be compacted to the same density as the adjacent material.
3. All service trenches under vehicular pavements shall be backfilled with an approved select material and compacted to a minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
(A) Local authority requirements,
(B) EPA – Pollution control manual for urban stormwater,
(C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control drawings and notes are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
The erosion and sediment control plan shall be implemented and adapted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

WATER QUALITY TESTING REQUIREMENTS

Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:

- Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
- If required subject to the environmental consultants advice, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system.This should include comments from a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site into Councils storm water drainage system. Outlining the proposed, ongoing monitoring, contingency plans and validation program that will be in place to continually monitor the quality of water discharged from this site. This should outline the frequency of water quality testing that will be undertaken by a suitably qualified environmental consultant.

BOUNDARY AND EASEMENT NOTE

The property boundary and easement locations shown on Taylor Thomson Whitting drawing's have been based from information received from : LTS

Taylor Thomson Whitting makes no guarantees that the boundary or easement information shown is correct.
Taylor Thomson Whitting will accept no liabilities for boundary inaccuracies. The contractor/builder is advised to check/confirm all boundaries in relation to all proposed work prior to the commencement of construction. Boundary inaccuracies found are to be reported to the superintendent prior to construction starting.

SAFETY IN DESIGN

Contractor to refer to Appendix B of the Civil Specification for the Civil Risk and Solutions Register.

EXISTING SERVICES

Contractor to be aware existing services are located within the site. Location of all services to be verified by the Contractor prior to commencing works. Contractor to confirm with relevant authority regarding measures to be taken to ensure services are protected or procedures are in place to demolish and/or relocate.

EXISTING STRUCTURES

Contractor to be aware existing structures may exist within the site. To prevent damage to existing structure(s) and/or personnel, site works to be carried out as far as practicably possible from existing structure(s).

EXISTING TREES

Contractor to be aware existing trees exist within the site which need to be protected. To prevent damage to trees and/or personnel, site works to be carried out as far as practicably possible from existing trees. Advice needs to be sought from Arborist and/or Landscape Architect on measures required to protect trees.

GROUNDWATER

Contractor to be aware ground water levels are close to existing surface level. Temporary de-watering may be required during construction works.

EXCAVATIONS

Deep excavations due to stormwater drainage works is required. Contractor to ensure safe working procedures are in place for works. All excavations to be fenced off and batters adequately supported to approval of Geotechnical Engineer.

GROUND CONDITIONS

Contractor to be aware of the site geotechnical conditions. Refer to geotechnical report by COFFEY (754-SYDGE233510-AC dated 28.08.20).

HAZARDOUS MATERIALS

Existing asbestos products & contaminated material may be present on site. Contractor to ensure all hazardous materials are identified prior to commencing works. Safe working practices as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report by COFFEY ("Limited Asbestos ans Hazardous Material Pre-Demolition Survey R02" dated 13.05.20).

CONFINED SPACES

Contractor to be aware of potential hazards due to working in confined spaces such as stormwater pits, trenches and/or tanks. Contractor to provide safe working methods and use appropriate PPE when entering confined spaces.

MANUAL HANDLING

Contractor to be aware manual handling may be required during construction. Contractor to take appropriate measures to ensure manual handling procedures and assessments are in place prior to commencing works.

WATER POLLUTION

Contractor to ensure appropriate measures are taken to prevent pollutants from construction works contaminating the surrounding environment.

SITE ACCESS/EGRESS

Contractor to be aware site works occur in close proximity to footpaths and roadways. Contractor to erect appropriate barriers and signage to protect site personnel and public.

VEHICLE MOVEMENT

Contractor to supply and comply with traffic management plan and provide adequate site traffic control including a certified traffic marshall to supervise vehicle movements where necessary.

EXISTING SERVICES LEGEND

es	Existing sewer
ew	Existing water
eeu	Existing underground electrical
EA	Existing aerial electrical
et	Existing communications
eg	Existing gas
SW	Existing stormwater

SITEWORKS LEGEND

F22.20	Finished surface level
F22.00	Finished contour
K&G	Kerb and gutter
KO	Kerb only
FK	Flush kerb
DD	Dish drain
MK	Mountable kerb
MIK	Mountable integral kerb
MIK+TE	Mountable integral kerb with thickened edge
IK+TE	Integral kerb with thickened edge
TE	Thickened edge
IK	Integral kerb
IK+ED	Integral kerb with edge downturn
K&T	Kerb and toe
IL10.00 600 ø "Z" 1.25% Q=345 L/s IL9.65	Stormwater pit, flow direction and line with Invert level upstream Pipe size and class Pipe grade Flow (Litres per second) Invert level downstream
GD	Grated drain
	Subsoil drainage line (100 dia) – refer detail sheets
IR	Intermediate riser with subsoil drainage line (100 dia)
FP	Flushing point with subsoil drainage line (100 dia)
DP	Down pipe
RP	Rodding point
	Concrete encased stormwater line
	Stormwater line with pipe taper and flow direction
	Taper kerb to zero height over 500 mm
	Wheelstop
RW#	Blockwork retaining wall
RW#	Brickwork retaining wall
DEJ	Dowelled expansion joint
SJ	Sawn joint
KJ	Keyed construction joint
WPJ	Weakened plane joint
EJ	Expansion joint
TKJ	Tied keyed joint
	Grass catch drain
	Overland flow path
	Guard Rail

LOCALITY PLAN

DRAWING SCHEDULE

Drawing No:	Drawing Title:
CV-82-A-001	NOTES AND LEGEND SHEET
CV-82-A-002	EROSION AND SEDIMENT CONTROL PLAN
CV-82-A-004	SITEWORKS PLAN
CV-82-A-006	DETAIL SHEET 1
CV-82-A-008	CATCHMENT PLAN - PRE DEVELOPMENT
CV-82-A-009	CATCHMENT PLAN - POST DEVELOPMENT

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NOT TO BE USED FOR CONSTRUCTION

FileName: CV-82-A-001.dwg - USER: jonnyw - Plot File Created: Mar 12, 2021 - 2:12pm

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P4	ISSUE FOR APPROVAL	AH	JW	12.03.21
P3	ISSUE FOR APPROVAL	AH	SH	25.02.21
P2	ISSUE FOR APPROVAL	AH	JW	16.02.21
P1	PRELIMINARY	AA	JW	09.02.21

Rev Description Eng Draft Date | Rev Description Eng Draft Date

Architect
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22/135 KINGS STREET, NSW 200

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Project
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Sheet Subject
NOTES AND LEGEND SHEET

Scale : A1 NTS | Drawn JW | Authorised SB
Job No 201635 | Drawing No CV-82-A-001 | Revision P4
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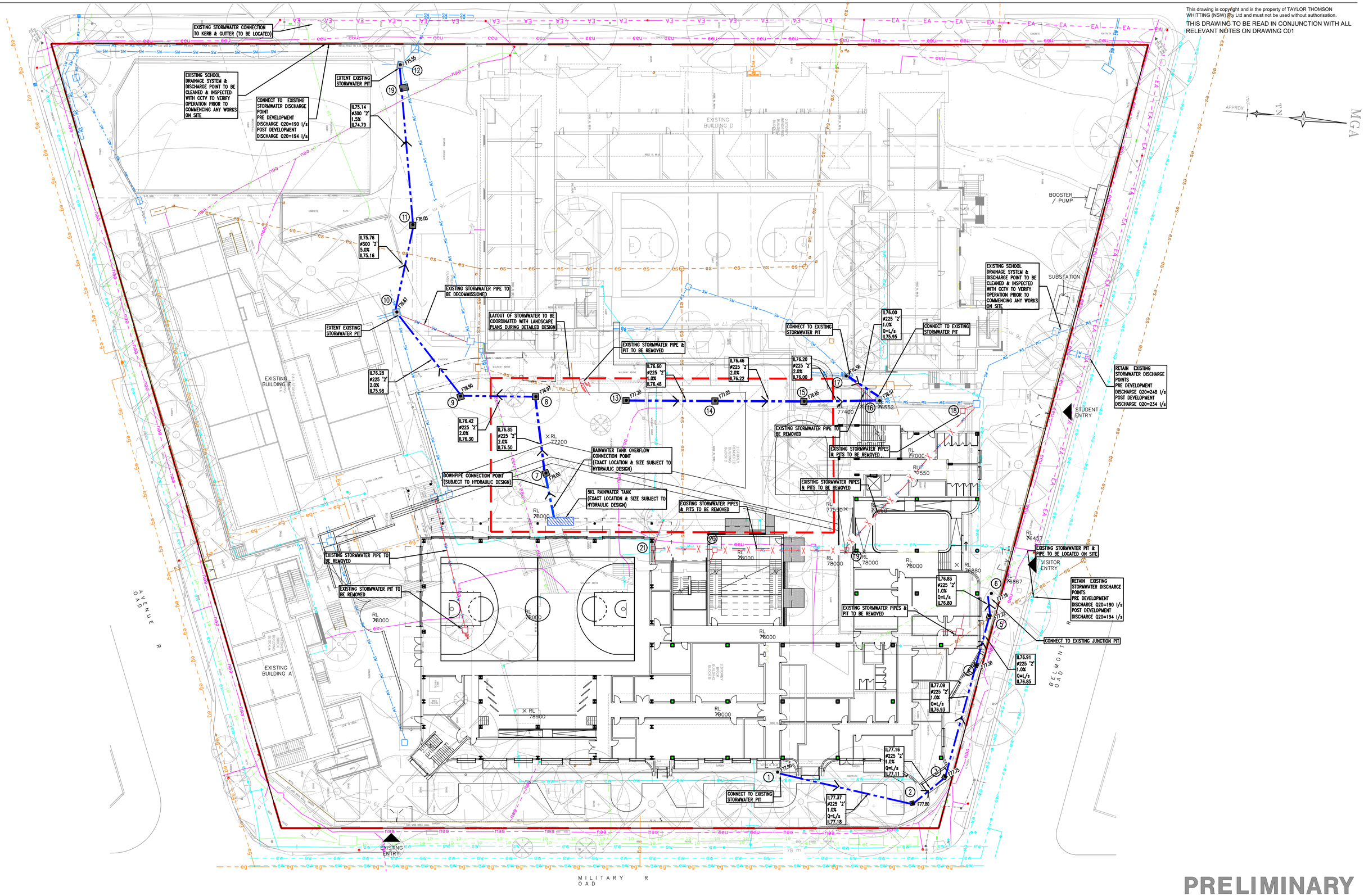

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PRELIMINARY
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Rev	Description	Eng	Draft	Date
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Sheet Subject
SITEWORKS PLAN

Scale : A1 1:250
Drawn JW
Authorised SB
Job No 201635
Drawing No CV-82-A-004
Revision P4
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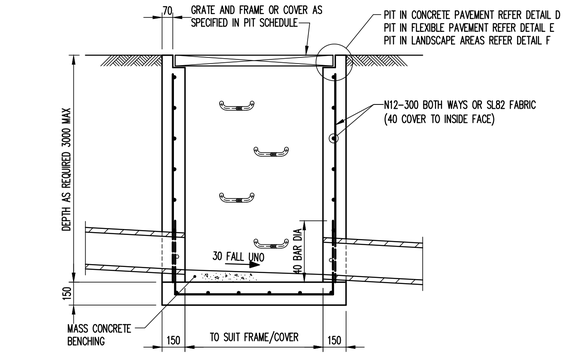
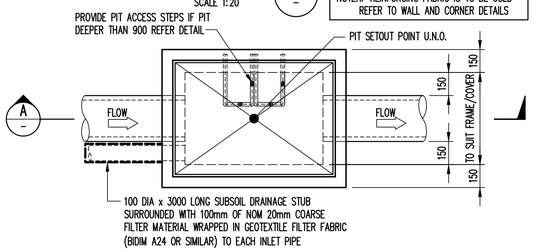


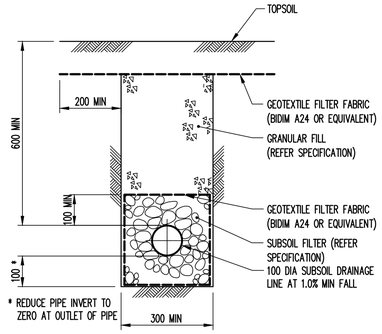
SECTION A
SCALE 1:20

NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS

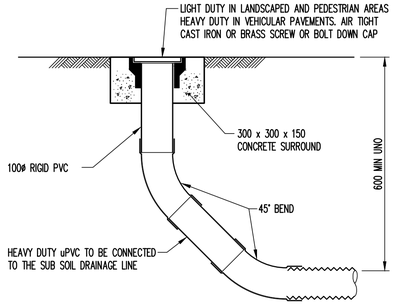


PLAN
SCALE 1: 20

PIT TYPE A

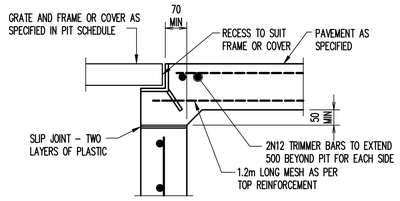


SUBSOIL IN LANDSCAPED AREAS
SCALE 1: 10

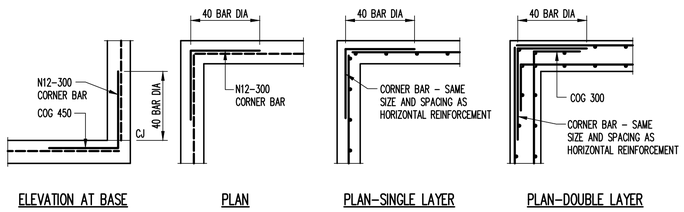


FLUSHING POINT (FP)
SCALE 1: 10

NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



DETAIL D
SCALE 1: 10



PIT CORNER DETAILS
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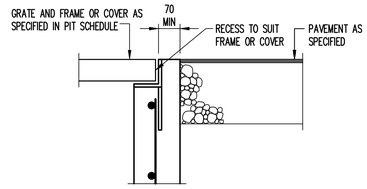
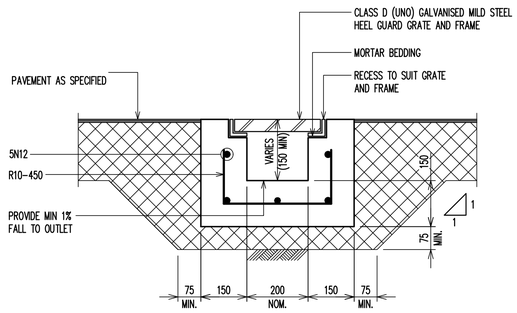


DETAIL E
SCALE 1: 10



GRATED DRAIN TYPE A (GD)
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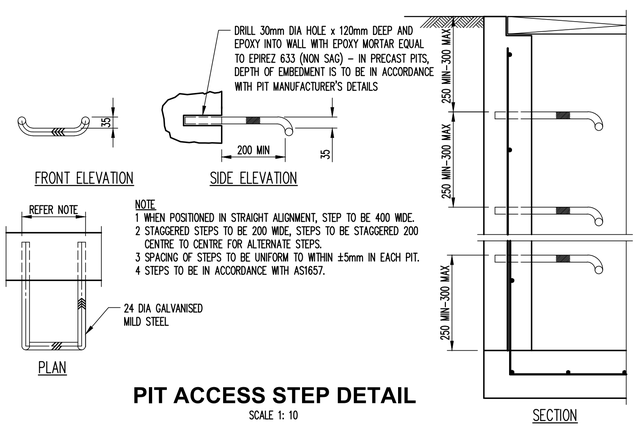
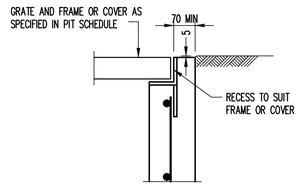


NOTE
1 WHEN POSITIONED IN STRAIGHT ALIGNMENT, STEP TO BE 400 WIDE.
2 STAGGERED STEPS TO BE 200 WIDE, STEPS TO BE STAGGERED 200 CENTRE TO CENTRE FOR ALTERNATE STEPS.
3 SPACING OF STEPS TO BE UNIFORM TO WITHIN ±5mm IN EACH PIT.
4 STEPS TO BE IN ACCORDANCE WITH AS1657.

PIT ACCESS STEP DETAIL
SCALE 1: 10



DETAIL F
SCALE 1: 10

FileName: CV-82-A-006.dwg - USER: sothih - Plot File Created: Feb 25, 2021 - 12:15pm

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P3	ISSUE FOR APPROVAL	AH	JW	25.02.21
P2	ISSUE FOR APPROVAL	AH	JW	16.02.21
P1	PRELIMINARY	AA	JW	09.02.21

Rev Description Eng Draft Date | Rev Description Eng Draft Date

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Sheet Subject
DETAIL SHEET 1

Scale : A1 100 | Drawn JW | Authorised SB
Job No 201635 | Drawing No CV-82-A-006 | Revision P3
Plot File Created: Feb 25, 2021 - 12:15pm

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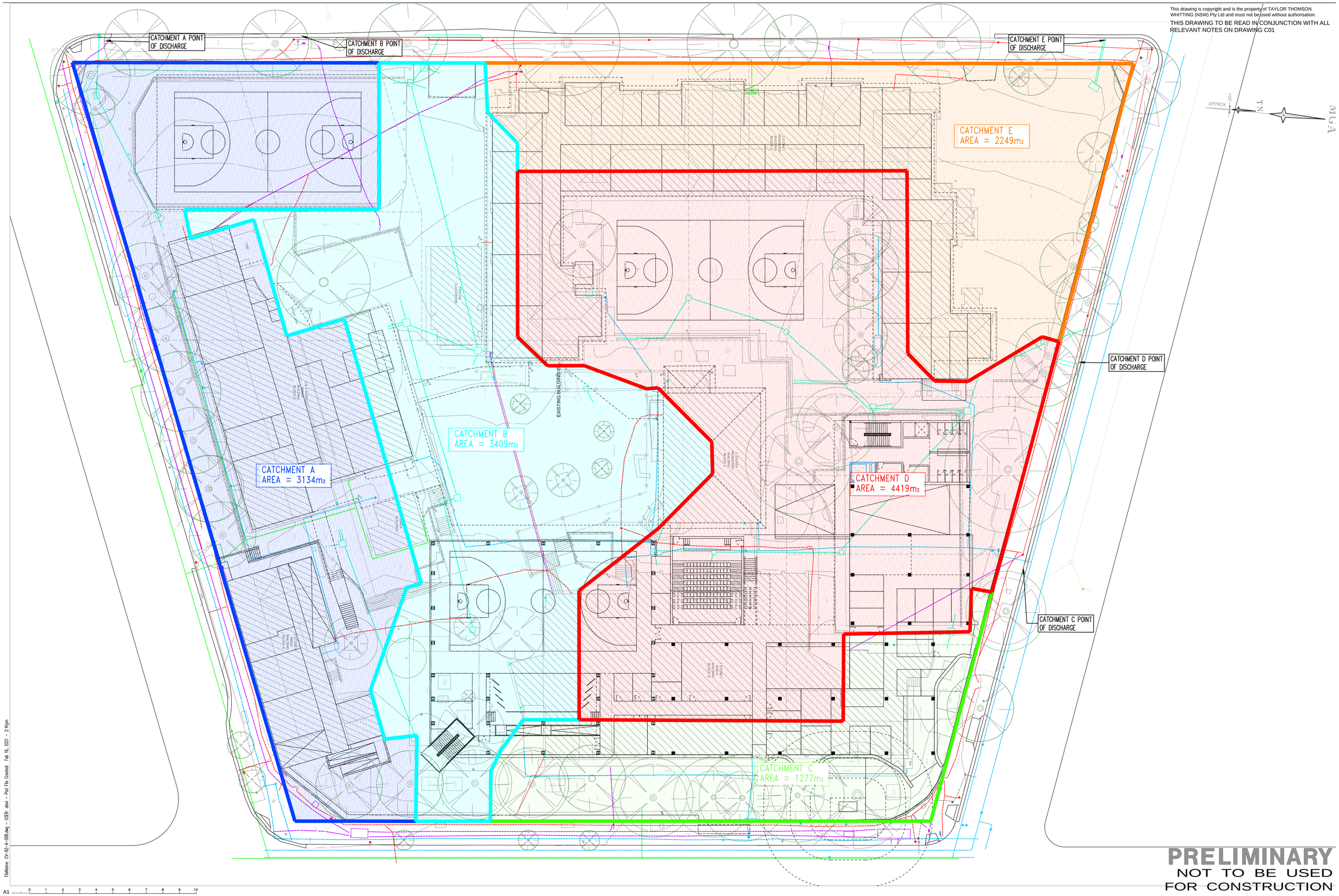

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Rev	Description	Eng	Draft	Date
P2	ISSUE FOR APPROVAL	AH	JW	16.02.21
P1	PRELIMINARY	AA	JW	09.02.21

Architect
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Sheet Subject
CATCHMENT PLAN - PRE DEVELOPMENT

Scale : A1 1:250
Drawn JW
Authorised SB
Job No 201635
Drawing No CV-82-A-008
Revision P2
Plot File Created: Feb 16, 2021 - 2:41pm

FileName: CV-82-A-008.dwg - USER: dexi - Plot File Created: Feb 16, 2021 - 2:41pm

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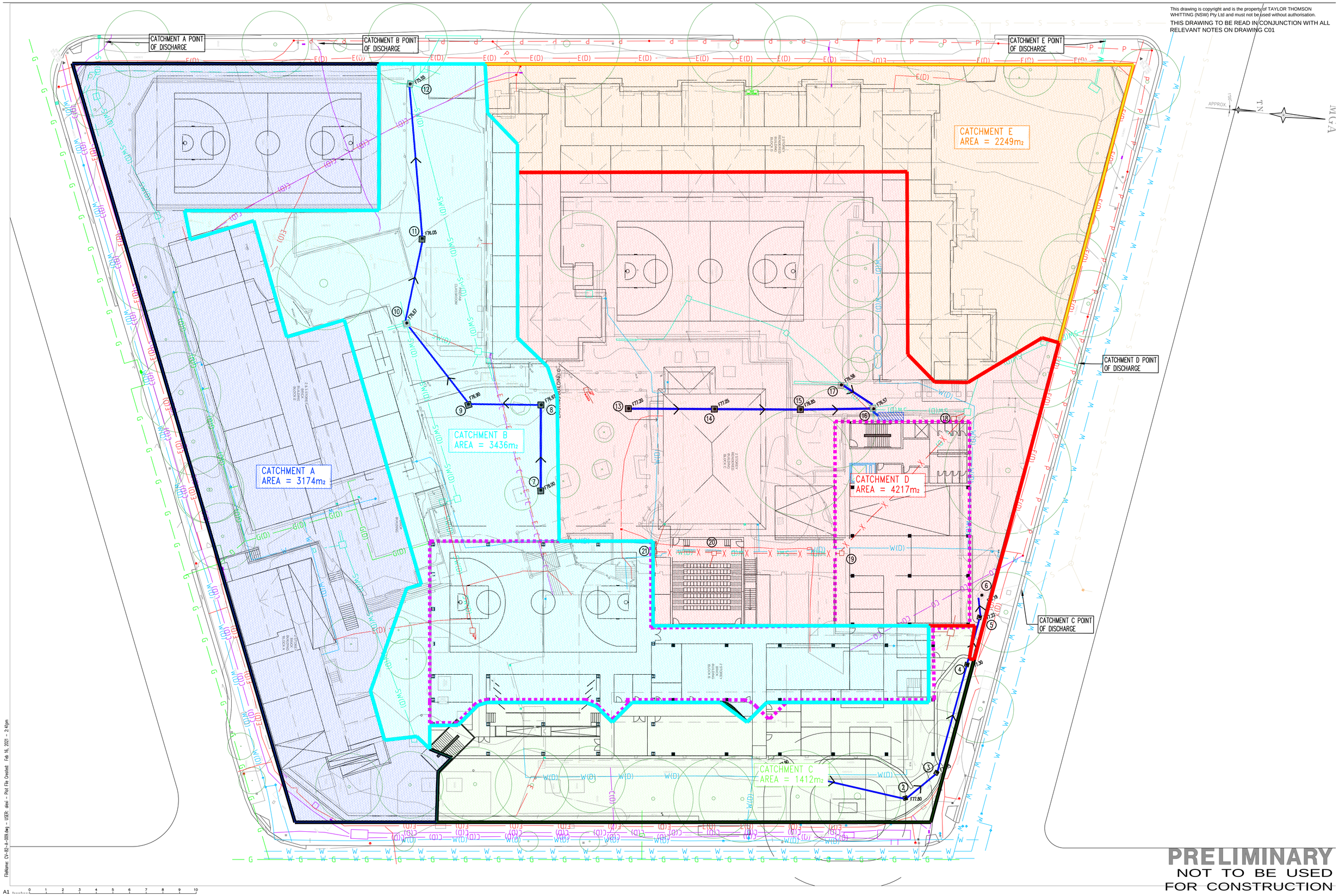

PRELIMINARY
NOT TO BE USED
FOR CONSTRUCTION

Rev	Description	Eng	Draft	Date
P2	ISSUE FOR APPROVAL	AH	JW	16.02.21
P1	PRELIMINARY	AA	JW	09.02.21

Architect
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Project
MOSMAN HIGH SCHOOL UPGRADE
745 MILITARY ROAD, MOSMAN , NSW 2088

Sheet Subject
CATCHMENT PLAN - POST DEVELOPMENT

Scale : A1	Drawn	Authorised
1:250	JW	SB

Job No	Drawing No	Revision
201635	CV-82-A-009	P2

Plot File Created: Feb 16, 2021 - 2:41pm

FileName: CV-82-A-009.dwg – USER: alexd – Plot File Created: Feb 16, 2021 - 2:41pm